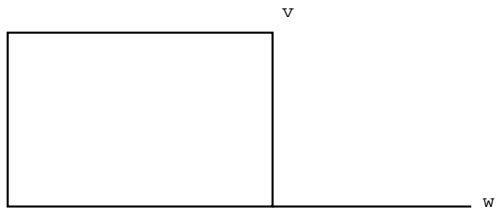
CS 174 Homework Assignment 8 (due Thursday, April 25)

1. Let two particles perform independent random walks on an undirected graph G. Suppose that the graph has n vertices, is connected and is non-bipartite. Give polynomial bounds on the *rendezvous time*—the expected time it takes for the two particles to arrive at the same state at the same time.

2. Consider the following graph.



   (a) By computing potential differences in a suitable current flow, find the expected hitting time H_{uv} from each vertex u to the marked vertex v.

   (b) By computing resistances, find the expected commute time $C_{vw} = H_{vw} + H_{wv}$ between the marked vertices v and w.

   (c) Compute an upper bound on the expected cover time C_v from vertex v using the general result $C_v \leq 2m(n-1)$ derived in class.

   (d) Compute a better bound on C_v by using directly the argument we used to prove the general result: i.e., add up the commute times around a particular spanning tree. Use the spanning tree that gives you the best bound.

   (e) Simulate a random walk on the graph and hence get a good statistical estimate of C_v. How close is this to your upper bound in part (d)?